AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Claims 58-113 (Cancelled)

114. (New) Computer apparatus operable to process data to model energy propagation within a three dimensional scene, the apparatus comprising:

a first definer operable to define a three dimensional environment for containing the three dimensional scene;

a second definer operable to define a plurality of predetermined discrete energy propagation pathways in a plurality of directions within the defined three dimensional environment, which pathways are independent of any defined energy receiver, object or energy source;

a creator operable to create the three dimensional scene within the three dimensional environment by locating objects and energy sources within said three dimensional environment;

a determiner operable to determine intersections between said predetermined pathways and said objects and energy sources within said three dimensional environment;

a first calculator operable to calculate propagation of energy along said predetermined pathways in accordance with said objects and energy sources and the intersections determined by said determiner;

a third definer operable to define an energy receiver within said three dimensional environment;

an identifier operable to identify which of said predetermined pathways intersect said energy receiver; and

a second calculator operable to calculate energy received by said energy receiver within said three dimensional environment in accordance with the calculated energy propagation along the identified predetermined pathways which intersect said energy receiver.

115. (New) Apparatus in accordance with claim 114, wherein the second calculator is operable to calculate an energy magnitude value based on energy received by the energy receiver.

116. (New) Apparatus in accordance with claim 114, wherein the third definer is operable to locate a viewing plane within said three dimensional environment.

117. (New) Apparatus in accordance with claim 116, wherein the second calculator is operable to determine, for each identified pathway that intersects said viewing plane, an angle of incidence of the pathway with said viewing plane, and to generate image data in accordance with the determined angles of incidence.

118. (New) Apparatus in accordance with claim 114, wherein the second definer is operable to define a plurality of subsets of pathways, the pathways of each

subset being parallel to each other and having a different orientation to the pathways of the other subsets.

119. (New) Apparatus in accordance with claim 118, wherein the second definer is operable to define said subsets such that each subset of pathways includes parallel pathways arranged in a rectangular array.

120. (New) Apparatus in accordance with claim 118, wherein said second definer includes an indexer operable to index subsets of pathways in accordance with the direction of the pathways of each subset.

121. (New) Apparatus in accordance with claim 120, wherein the indexer is operable to index subsets in accordance with spherical coordinates relative to a reference plane.

122. (New) Apparatus in accordance with claim 121, wherein the second definer is operable to define a larger number of pathways in directions at smaller angles to the reference plane than are defined in directions at larger angles to the reference plane, such that the distribution of pathway directions within the three dimensional environment is substantially uniform.

123. (New) Apparatus in accordance with claim 122, wherein the second definer is operable to define pathways such that the number of pathways defined in

directions at a particular angle to the reference plane is substantially proportional to the complement of said particular angle.

124. (New) Apparatus in accordance with claim 114, wherein the determiner is operable to store, for each determined intersection, information relating to the identity of the associated pathway and the object that the pathway intersects.

125. (New) Apparatus in accordance with claim 124, wherein the determiner is operable to store, for each determined intersection, information defining energy propagation at that intersection.

126. (New) Apparatus in accordance with claim 114, wherein the first calculator is operable to process energy propagation information for a pathway with an intersection with an object, to identify one or more pathways onto which energy is to be propagated from said intersection pathway, and to generate energy propagation information for said identified pathway or pathways.

127. (New) Apparatus for generating data representing a three dimensional scene, the apparatus comprising:

a first definer operable to define a three dimensional environment for containing the three dimensional scene within which energy propagation is to be represented;

a second definer operable to define a plurality of predetermined discrete energy propagation pathways in a plurality of directions within the defined three dimensional

environment, which pathways are independent of any defined viewpoint, object or energy source;

a creator operable to create the three dimensional scene within the three dimensional environment by locating objects and energy sources within said three dimensional environment;

a determiner operable to determine intersections between said predetermined pathways and said objects and energy sources within said three dimensional environment; and

a data store operable to store data representative of said three dimensional scene, including data identifying said determined intersections.

128. (New) Apparatus in accordance with claim 127, wherein the second definer is operable to define a plurality of subsets of pathways, the pathways of each subset being parallel to each other and having a different orientation to the pathways of the other subsets.

129. (New) Apparatus in accordance with claim 128, wherein the second definer is operable to define said subsets such that each subset of pathways includes parallel pathways arranged in a rectangular array.

130. (New) Apparatus in accordance with claim 128, wherein the second definer includes an indexer operable to index subsets of pathways in accordance with the direction of the pathways of each subset.

131. (New) Apparatus in accordance with claim 130, wherein the indexer is operable to index subsets in accordance with spherical coordinates relative to a reference plane.

132. (New) Apparatus in accordance with claim 131, wherein the second definer is operable to define an environment which comprises a larger number of pathways in directions at smaller angles to the reference plane than are defined in directions at larger angles to the reference plane, such that the distribution of pathway directions within the three dimensional environment is substantially uniform.

133. (New) Apparatus in accordance with claim 132, wherein the second definer is operable to define pathways such that the number of pathways defined in directions at a particular angle to the reference plane is substantially proportional to the complement of said particular angle.

134. (New) Apparatus in accordance with claim 127, wherein the determiner is operable to store, for each determined intersection, information relating to the identity of the associated pathway and the object that the pathway intersects.

135. (New) Apparatus in accordance with claim 134, further comprising:

a calculator operable to calculate data defining propagation of energy along said predetermined pathways in accordance with said objects and energy sources and the

intersections determined by said determiner and wherein the determiner is operable to store, for each determined intersection, information defining energy propagation at that intersection.

136. (New) Apparatus in accordance with claim 135, wherein the calculator is operable to process energy propagation information for a pathway with an intersection with an object, to identify one or more pathways onto which energy is to be propagated from said intersecting pathway, and to generate energy propagation information for said identified pathway or pathways.

137. (New) Apparatus for analyzing energy propagation within a three dimensional scene, comprising:

a first receiver operable to receive data defining a three dimensional environment for containing the three dimensional scene;

a second receiver operable to receive data defining a plurality of predetermined discrete energy propagation pathways in a plurality of directions within the defined three dimensional environment, which pathways are independent of any defined energy receiver, object or energy source;

a third receiver operable to receive data defining the three dimensional scene within the three dimensional environment by locating objects and energy sources within the three dimensional environment;

a fourth receiver operable to receive data identifying intersections between said pathways and said objects and said energy sources within said three dimensional environment;

a fifth receiver operable to receive data defining propagation of energy along said pathways;

a definer operable to define an energy receiver within said three dimensional environment;

an identifier operable to identify which of said predetermined pathways intersect said energy receiver; and

a calculator operable to calculate energy received by said energy receiver in accordance with the energy propagated along the identified predetermined pathways which intersect said energy receiver.

138. (New) Apparatus in accordance with claim 137, wherein the second receiver is operable to receive data defining a plurality of subsets of pathways, the pathways of each subset being parallel to each other and having a different orientation to the pathways of the other subsets.

139. (New) Apparatus in accordance with claim 137, wherein the calculator is operable to calculate an energy magnitude value on the basis of energy received by the energy receiver.

140. (New) Apparatus in accordance with claim 137, wherein the definer is operable to locate a viewing plane within said environment.

141. (New) Apparatus in accordance with claim 140, wherein the calculator is operable to determine, for each identified pathway that intersects said viewing plane, an angle of incidence of the pathway with said viewing plane, and to generate image data in accordance with the determined angles of incidence.

142. (New) A method of processing data in an electronic processing apparatus to generate data defining energy received by an energy receiver within a three dimensional scene, the method comprising:

defining a three dimensional environment for containing the three dimensional scene;

defining a plurality of predetermined discrete energy propagation pathways in a plurality of directions within the defined three dimensional environment, which pathways are independent of any defined energy receiver, object or energy source;

creating the three dimensional scene within the three dimensional environment by locating objects and energy sources within said three dimensional environment;

determining intersections between said predetermined pathways and said objects and energy sources;

calculating data defining the propagation of energy along said predetermined pathways in accordance with said objects and energy sources and the intersections determined in said determining step;

storing, in a data store, said data defining the propagation of energy along said predetermined pathways;

defining an energy receiver at a position in said three dimensional environment;

identifying which of said predetermined pathways intersect said energy receiver; and

calculating a value indicative of energy received by said energy receiver in accordance with the stored data defining the energy propagation along the identified predetermined pathways which intersect said energy receiver.

143. (New) A method in accordance with claim 142, wherein the energy calculating step includes calculating an energy magnitude value on the basis of energy received by the energy receiver.

144. (New) A method in accordance with claim 142, wherein the step of defining an energy receiver includes locating a viewing plane within said environment.

145. (New) A method in accordance with claim 144, wherein the energy calculating step includes determining, for each identified pathway that intersects said viewing plane, an angle of incidence of the pathway with said viewing plane, and generating image data in accordance with the determined angles of incidence.

146. (New) A method in accordance with claim 142, wherein the step of defining said plurality of predetermined discrete energy propagation pathways

comprises the step of defining a plurality of subsets of pathways, the pathways of each subset being parallel to each other and having a different orientation to the pathways of the other subsets.

147. (New) A method in accordance with claim 146, wherein the step of defining said pathways includes defining each said subset of pathways to include parallel pathways arranged in a rectangular array.

148. (New) A method in accordance with claim 146, wherein the step of defining said pathways includes indexing the subsets of pathways in accordance with the direction of the pathways of each subset.

149. (New) A method in accordance with claim 148, wherein the step of indexing includes indexing subsets in accordance with spherical coordinates relative to a reference plane.

150. (New) A method in accordance with 149, wherein the step of defining said pathways defines a larger number of pathways in directions at smaller angles to the reference plane than are defined in directions at larger angles to the reference plane, such that the distribution of pathway directions within the three dimensional environment is substantially uniform.

151. (New) A method in accordance with claim 150, wherein the step of defining said pathways defines the number of pathways in directions at a particular angle to the reference plane substantially proportional to the complement of said particular angle.

152. (New) A method in accordance with claim 142, wherein the step of determining intersections includes the step of storing, for each determined intersection, information relating to the identity of the associated pathway and the object that the pathway intersects.

153. (New) A method in accordance with claim 142, wherein the step of calculating energy propagation includes processing energy propagation information for a pathway with an intersection with an object, identifying one or more pathways onto which energy is to be propagated from said intersecting pathway, and generating energy propagation information for said identified pathway or pathways.

154. (New) A method of processing data in an electronic processing apparatus to generate data representing a three dimensional scene, the method comprising:

defining a three dimensional energy propagation environment for containing the three dimensional scene within which energy propagation is to be represented;

defining a plurality of predetermined discrete energy propagation pathways in a plurality of directions within the defined three dimensional environment, which pathways are independent of any defined viewpoint, object or energy source;

creating the three dimensional scene within the three dimensional environment by locating objects and energy sources within said three dimensional environment;

determining intersections between said predetermined pathways and said objects and energy sources within said three dimensional environment; and

storing, in a data store, data representative of the three dimensional scene, including data identifying said determined intersections.

155. (New) A method in accordance with claim 154, wherein the step of defining said pathways comprises defining a plurality of subsets of pathways, the pathways of each subset being parallel to each other and having a different orientation to the pathways or the other subsets.

156. (New) A method in accordance with claim 155, wherein the step of defining said pathways includes defining each said subset of pathways to include parallel pathways arranged in a rectangular array.

157. (New) A method in accordance with claim 155, wherein the step of defining said pathways includes indexing subsets of pathways in accordance with the direction of the pathways of each subset.

158. (New) A method in accordance with claim 157, wherein the indexing step includes indexing subsets in accordance with spherical coordinates relative to a reference plane.

159. (New) A method in accordance with claim 158, wherein the step of defining said pathways comprises defining a larger number of pathways in directions at smaller angles to the reference plane than are defined in directions at larger angles to the reference plane, such that the distribution of pathway directions within the three dimensional environment is substantially uniform.

160. (New) A method in accordance with claim 159, wherein the step of defining said pathways comprises defining a number of pathways in directions at a particular angle to the reference plane substantially proportional to the complement of said particular angle.

161. (New) A method in accordance with claim 154, wherein the step of determining intersections includes the step of storing, for each determined intersection, information relating to the identity of the associated pathway and the object that the pathway intersects.

162. (New) A method in accordance with claim 161, further comprising the step of calculating data defining propagation of energy along said predetermined pathways in accordance with said objects and energy sources and the intersections determined in said determining step and wherein said determining step stores, for each determined intersection, information defining energy propagation at the intersection.

163. (New) A method in accordance with claim 162, wherein the step of calculating energy propagation includes processing energy propagation information for a pathway with an intersection with an object, identifying one or more pathways on to which energy is to be propagated from said intersecting pathway, and generating energy propagation information for said pathway or pathways.

164. (New) A method of processing data in an electronic processing apparatus to generate data defining energy received by an energy receiver within a three dimensional scene, comprising:

receiving and storing data defining a three dimensional environment for containing a three dimensional scene;

receiving data defining a plurality of predetermined discrete energy propagation pathways in a plurality of directions within the defined three dimensional environment, which pathways are independent of any defined energy receiver;

receiving data defining the three dimensional scene within the three dimensional environment obtained by locating objects and energy sources within said three dimensional environment;

receiving data identifying intersections between said pathways and said objects and said energy sources within said three dimensional environment;

receiving data defining propagation of energy along said pathways;

positioning an energy receiver within said three dimensional environment;

identifying which of said predetermined pathways intersect said energy receiver; and

calculating and outputting a value indicative of energy received by said energy receiver in accordance with the energy propagated along the identified predetermined pathways which intersect said energy receiver.

165. (New) A method in accordance with claim 164, wherein the step of receiving data defining said plurality of predetermined discrete energy propagation pathways is operable to receive data defining a plurality of subsets of pathways, the pathways of each subset being parallel to each other and having a different orientation to the pathways of other subsets.

166. (New) A method in accordance with claim 164, wherein the energy calculating step includes calculating an energy magnitude value on the basis of energy received by the energy receiver.

167. (New) A method in accordance with claim 164, wherein the step of positioning an energy receiver includes locating a viewing plane within said environment.

168. (New) A method in accordance with claim 167, wherein the energy calculating step includes determining, for each identified pathway that intersects said viewing plane, an angle of incidence of the pathway with said viewing plane, and generating image data in accordance with the determined angles of incidence.

169. (New) A method in accordance with claim 145, further including the steps of:

generating a signal conveying image data generated by said image data generating step; and

recording the signal either directly or indirectly.

170. (New) A method in accordance with claim 162, further including the steps of:

generating a signal conveying information defining said pathways, intersections of said pathways and propagation of energy along said pathways; and

recording the signal either directly or indirectly.

171. (New) A computer readable medium storing computer implementable code for causing a programmable computer device to process data to model energy propagation within a three dimensional scene, the computer implementable code comprising:

code operable to define a three dimensional environment for containing the three dimensional scene;

code operable to define a plurality of predetermined discrete energy propagation pathways in a plurality of directions within the defined three dimensional environment, which pathways are independent of any defined energy receiver, object or energy source;

code operable to create the three dimensional scene within the three dimensional environment by locating objects and energy sources within said three dimensional environment;

code operable to determine intersections between said predetermined pathways and said objects and energy sources within said three dimensional environment;

code operable to calculate propagation of energy along said predetermined pathways in accordance with said objects and energy sources and the intersections determined by said determining code;

code operable to define an energy receiver within said three dimensional environment;

code operable to identify which of said predetermined pathways intersect said energy receiver; and

code operable to calculate energy received by said energy receiver within said three dimensional environment in accordance with the calculated energy propagation along the identified predetermined pathways which intersect said energy receiver.

172. (New) A computer readable medium storing computer implementable code for causing a programmable computer device to generate data representing a three dimensional scene, the computer implementable code comprising:

code operable to define a three dimensional environment for containing the three dimensional scene within which energy propagation is to be represented;

code operable to define a plurality of predetermined discrete energy propagation pathways in a plurality of directions within the defined three dimensional environment, which pathways are independent of any defined viewpoint, object or energy source;

code operable to create the three dimensional scene within the three dimensional environment by locating objects and energy sources within said three dimensional environment;

code operable to determine intersections between said predetermined pathways and said objects and energy sources within said three dimensional environment; and

code operable to store data representative of said three dimensional scene, including data identifying said determined intersections.

173. (New) A computer readable medium storing computer implementable code for causing a programmable computer device to analyze energy propagation within a three dimensional scene, the computer implementable code comprising:

code operable to receive data defining a three dimensional environment for containing the three dimensional scene;

code operable to receive data defining a plurality of predetermined discrete energy propagation pathways in a plurality of directions within the defined three dimensional environment, which pathways are independent of any defined energy receiver, object or energy source;

code operable to receive data defining the three dimensional scene within the three dimensional environment by locating objects and energy sources within the three dimensional environment;

code operable to receive data identifying intersections between said pathways and said objects and said energy sources within said three dimensional environment;

code operable to receive data defining propagation of energy along said pathways;

code operable to define an energy receiver within said three dimensional environment;

code operable to identify which of said predetermined pathways intersect said energy receiver; and

code operable to calculate energy received by said energy receiver in accordance with the energy propagated along the identified predetermined pathways which intersect said energy receiver.